Feb. 10, 1953 R. H. LAWSON 2,627,736

KNITTING MACHINE

Filed March 18, 1950 2 SHEETS—SHEET 1

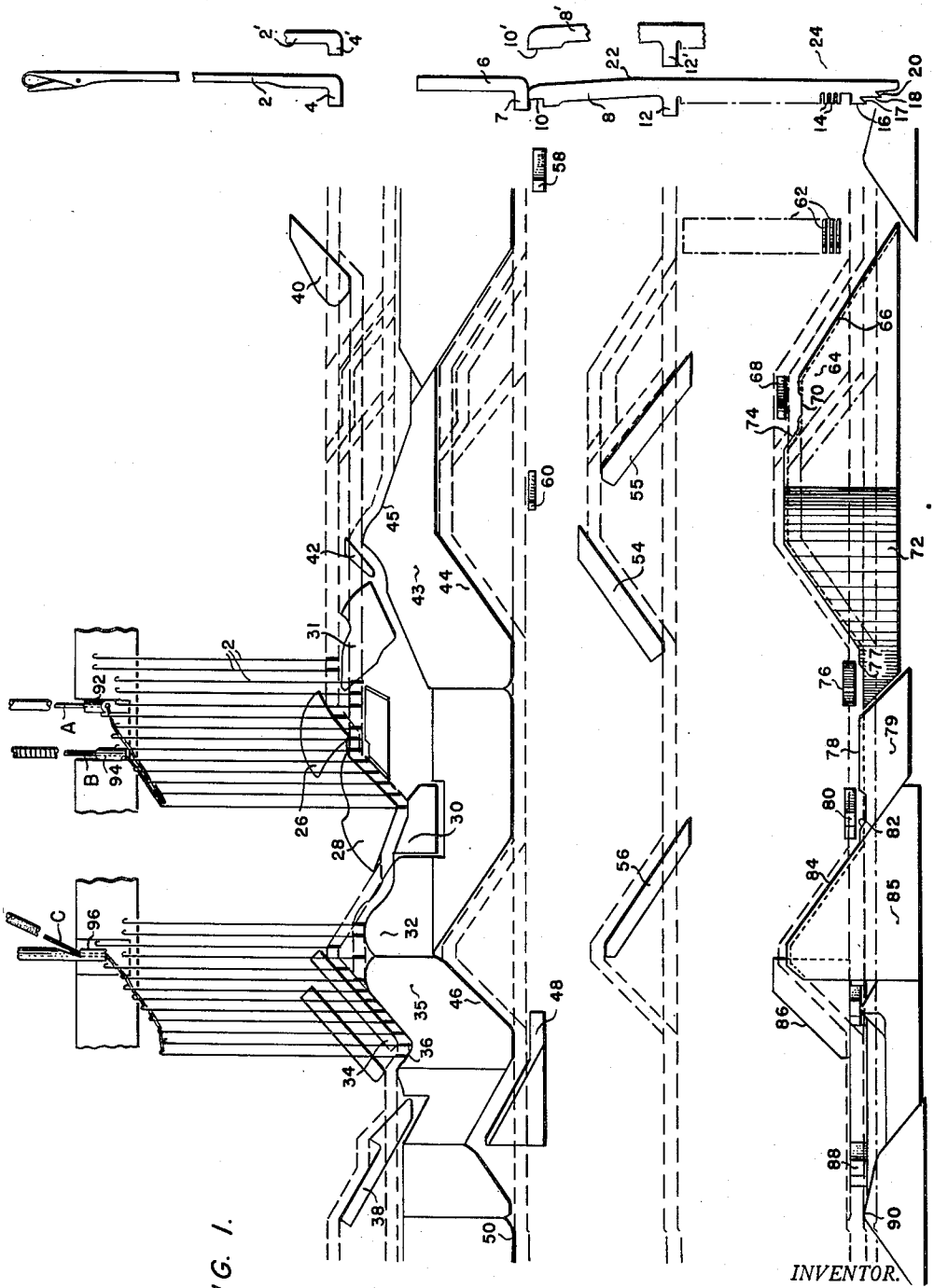


FIG. 1.

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KNITTING MACHINE

Filed March 18, 1950 2 SHEETS—SHEET 2

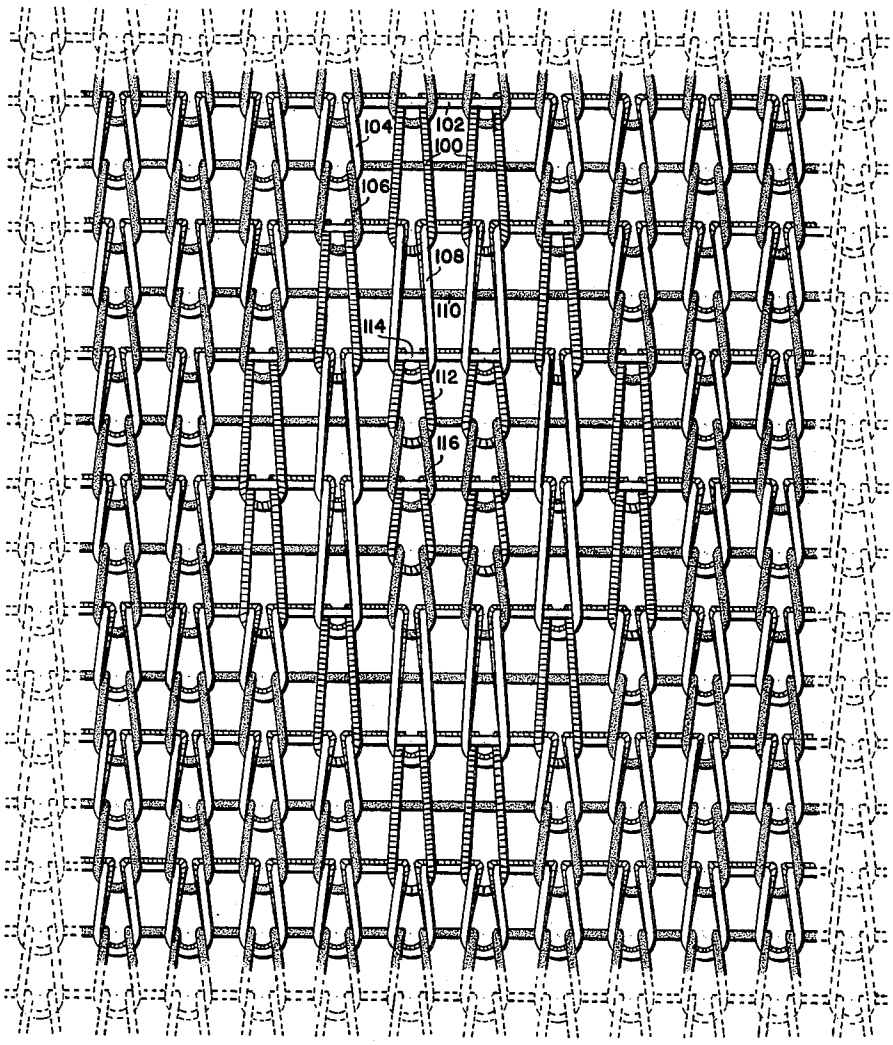


FIG. 2.

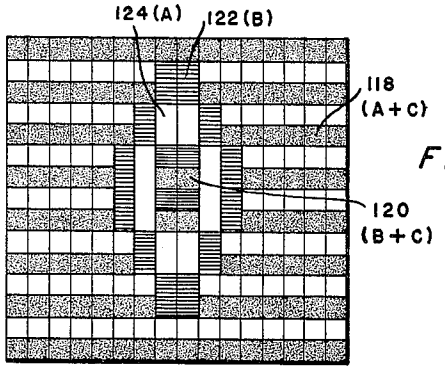


FIG. 3.

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UNITED STATES PATENT OFFICE

2,627,736

KNITTING MACHINE

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Application March 18, 1950, Serial No. 150,483

25 Claims. (Cl. 66—42)

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This invention relates to knitting methods and machines, particularly designed for the production of elaborate patterns under control of a single pattern mechanism. Specifically, in accordance with the invention, there is produced a fabric of two-feed type which, under control of a single pattern mechanism, such as a trick wheel, will show in effect areas of as many as four different colors or appearances when three yarns of different colors or types are fed to the machine, with or without embossed or other figured effects due to tucking or the holding of stitches.

As will be evident to those skilled in the art from the following description, the machine may be used for the production of elaborate patterns with less than three yarns fed thereto differing in color or type; and it will also be evident that with additions to the mechanism disclosed, for example by provisions for reverse plating control, or the like, even more elaborate patterning than that herein specifically disclosed may be achieved.

The broad object of the invention is the provision of a machine for the production of fabrics of the type just indicated, the invention being particularly concerned with the achievement of elaborate results under control of a single pattern mechanism. This object and other secondary objects, particularly relating to details of construction and operation of the machine, will become apparent from the following description, read in conjunction with the accompanying drawings, in which:

Fig. 1 is a development of the cams controlling the needles and cooperating intermediate and pattern jacks in the machine, there being indicated at the right in Fig. 1 the types of needles and jacks used;

Fig. 2 is a diagram illustrating a particular fabric produced in accordance with the invention; and

Fig. 3 is a diagram corresponding to Fig. 2 but indicating more clearly the color areas which are produced in accordance with the invention.

The invention will be described as applied to a circular knitting machine generally resembling that of the patent to I. W. Grothey 2,050,946, dated August 11, 1936 (except that the present invention does not relate to wrapping) and reference may be particularly made to said patent for certain details of trick wheel control of needle selection.

At the right-hand end of Figure 1 there are illustrated needles, intermediate jacks and pattern jacks associated with individual needles. Two types of needles 2 and 2' are used in the present machine which have, respectively, long

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butts 4 and short butts 4', the needles with the short butts 4' being arranged to knit the back of the leg, the heel, the sole and the toe of a stocking. As will appear hereafter the distinction of butts is not only for the usual purpose of segregating the two groups of needles during reciprocatory knitting of heels and toes but is additionally for the purpose of making possible the elimination of patterns from a high splice and the sole of a stocking.

Located below each needle is an intermediate jack 6 provided with a butt 7 subject to control by various cams hereafter described.

Below each intermediate jack there is located a pattern jack. The pattern jacks may be of four varieties which may first be considered as falling into two groups 8 and 8', depending upon the constructions at their upper ends. As indicated, the upper ends of the jacks 8' are provided with portions 10' presenting to certain cams an elongated upwardly extending outer edge. In the case of the jacks 8 this outer edge is broken away as indicated at 10 to provide a clearance for avoiding action on the jack by a cam which will be more fully described hereafter.

The jacks of both the groups 8 and 8' are provided with butts 12 and 12' of different lengths. Jacks with short butts 12 are associated with the instep needles having long butts 4. Jacks having long butts 12' are associated with the sole needles having short butts 4'.

Each jack of both types is provided with selection butts 14 which may be of any desired number, for example twenty-five, or the like, which butts may be selectively removed in setting up the arrangement of jacks in the needle cylinder to produce selection in patterning which, in general, resembles that commonly achieved through the use of this type of jack, i. e., by a proper relationship of removed butts and selector cams controlled by a trick wheel, which is provided with elements also having removable butts, quite elaborate patterns may be secured.

Located below the butts 14 there are elevating butts 16 and 18 which, as indicated, are so arranged that the butt 16 is outside the butt 18. Beneath each of these butts there is an angular notch such as indicated at 17 and 20, which notches are arranged to hook over the edges of suitable cams for the purpose of effecting selective rise of the various jacks.

The backs of the jacks are provided with fulcra 22 about which they may tilt, these fulcra engaging the bottoms of the slots in the needle cylinder 24, in which slots the needles, sliders and jacks are arranged in the same general fashion as in said Grothey patent.

The needles are associated in conventional fashion with sinkers which need not be described, the sinkers having conventional waves imparted thereto to provide knitting at a pair of feeds.

Referring first to the cams which act on needle butts, there are provided at the first feed in the machine a center cam 26, a forward stitch cam 28, and a reverse stitch cam 31, which latter is withdrawn so as to miss all needle butts during rotary knitting, with which the invention is primarily concerned, this cam being rendered active during reciprocatory knitting of heels and toes.

Below the forward stitch cam 28 is a cam 30 which raises the needles to a slight extent, this cam being followed by a cam 32 which is arranged to raise the needles to tuck level. A stitch cam 34 is arranged at the second feed and serves to lower all needles at that feed. The needles are thereafter slightly raised by the edge 36 of cam 35 and then raised to latch clearing level by the cam 38. As will appear hereafter, this cam 38 may be withdrawn so as to miss all needle butts, thereby to produce tucking. A cam 40 is provided to lower the needles, this cam being arranged to engage both long and short butts when patterning is to be carried throughout the circumference of a stocking and being withdrawn to miss short butts during the formation of a plain high splice or sole. A cam 42 is withdrawn during patterning operations and may be passed by both long and short butts. Edge 45 of cam 43 is provided to raise needles to tuck level.

Arranged to act on the butts 7 of intermediate jacks 6 are edge 44 of cam 43, edge 46 of cam 35 and cam 50, the last being particularly arranged to level jacks for selection. A cam 48 which may sometimes act upon butts 7 is withdrawn during patterning operations.

The butts 12 and 12' of the jacks may be acted on by cam 54. Another cam 56 is withdrawn except during the knitting of plain high splices and soles, when it is moved inwardly to engage long butts 12' but miss short butts 12. In connection with withdrawal of cam 38 as hereafter described, cam 55 is provided, this cam being withdrawn except during the knitting of plain high splices and soles when it is moved inwardly to engage long butts 12' but miss short butts 12.

A cam 58 (corresponding to the cam 100 of said Grothey patent) is provided for the purpose of rocking inwardly the upper ends of both sets of jacks 8 and 8', this cam being of a height and at a proper location to engage both the edge 10' of the jacks 8' and the portion of the upper ends of the jacks 8 below the cutaway portion 10 thereof. A second similar cam 60 may be selectively brought into action by either the main cam drum of the machine, or by the trick wheel referred to below, to engage only the edges 10' of the jacks 8', the clearance afforded at 10 on the jacks 8 causing this cam 60 to be ineffective on the jacks 8.

Selector cams 62, arranged in a stack, correspond in their respective levels to the butts 14 and are arranged to act selectively on these butts when butts at their respective heights are present. These cams 62 are controlled by butts on elements in a trick wheel as illustrated in said Grothey patent. The levers providing these cams are spring urged into engagement with the trick wheel butts so that the absence of a trick wheel butt corresponds to an active position of a corresponding cam 62. As described in said

Grothey patent the inward movements of the cams 62 are limited by suitable stop means so that while some of them may attain, under the actions of their springs, full inward positions, others may be moved only partially inwardly. All of them, however, are movable to outward, inactive positions by the action of the trick wheel butts. By reason of this arrangement the jacks 8 and 8' may be missed entirely or may be rocked inwardly by various of these cams either partially or fully. As will hereafter appear, the three resulting positions of the jacks 8 and 8' result in different cycles of operation for the purpose of controlling the stitches to be formed.

A cam 64 is provided with an upwardly sloping sharp edge 66 which is adapted to be embraced selectively by the notches 17 and 20 of the jacks. As the jacks are moved upwardly by this cam the engagement just referred to prevents accidental rocking.

A cam 68 is arranged to engage the edge 16 of a jack which has been raised with its notch 20 engaging the cam edge 66 so that such a jack is rocked inwardly, the upper edge of the cam 64 being relieved at 70 for clearance to permit this rocking. The cam 68 will miss those jacks which have their notches 17 riding up the cam edge 66.

The cam 64 is provided with a clearance at 72 so that its surface will not engage lower portions of jacks which may be rocked outwardly by the action of cam 60. Cam 64 is also provided with a sharp edge 74 as a continuation of the sharp upper edge 66 so as to be embraced by notches 17 of various jacks. The lower ends of such jacks will be rocked outwardly by this cam edge and later will be rocked inwardly by a cam 76 far enough for butt 18 to miss cam 79, the edge 74 being provided with a clearance at 77 to permit such action. A subsequent cam 79 is provided with a sharp edge 78 engageable by the notches 17 and at 82 this edge is provided with a clearance so that a cam 80 may rock the lower ends of jacks inwardly when this cam is active. Normally this cam is out of action and under such circumstances the notches 17 embrace and ride upwardly over the sharp edge 84 of another cam 85. A guard 86 prevents the lower part of a jack from rocking too far outwardly when being lowered by the action of the edge 46 of cam 35.

A cam 88 serves to rock inwardly the lower ends of all of the jacks to insure engagement of their notches 17 by a cam 90 which raises them slightly prior to their being slightly lowered by the action of cam 50 for alignment of their butts 14 at proper levels with respect to the selecting cams 62.

The actions of the various cams which have been described will be more fully understood from detailed consideration of the selective operations set forth hereafter.

A facing yarn A is fed from a finger 92 at the first feed, the yarn being fed at such circumferential position and level with respect to the cams 26 and 28 that those needles which are moving at a cleared level will engage the yarn A while needles which are moving at a lower tuck level will miss this yarn. A backing yarn B is fed at the first feed from a finger 94 so that it is engaged by all needles as they pass this feed. The two yarns A and B are fed in such relation that when both are taken by a needle a plated stitch is formed with the facing yarn A plating the backing yarn B.

At the second feed a yarn C is fed from a finger 96 at such level that it is taken by needles approaching the cam 34 at cleared level but is missed by needles which approach the cam 34 at tuck level, i. e., at the level defined by the cam 32.

Before proceeding with a description of details of operation there may be briefly referred to the general results secured by various selections, first assuming that cam 38 is in position to act on all needle butts.

Considering first that the cam 60 is withdrawn from action there will be no differentiation between the jacks 8 and 8'. Assuming that one of the selector cams 62 is in its full inward position and engages a butt 14 of a jack, the needle controlled by such jack will miss the facing yarn A but will take the backing yarn B at the first feed and will miss the yarn C at the second feed, the result then being the knitting of a stitch containing only the yarn B with the resulting appearance of the color of the yarn B at the face of the fabric.

If now it is assumed that the cam 60 is active, the jacks 8 and 8' will be differentiated in their operations. If a butt 14 of a jack 8 which is cut away at 10 is engaged by a cam 62 in full inward position the result will be as just described, i. e., its needle will take only the backing yarn B and produce a stitch displaying the color of this yarn.

On the other hand, if under the same conditions a jack 8' has a butt 14 engaged by a cam 62 in full inward position, the corresponding needle will miss facing yarn A and will take backing yarn B, the stitch of yarn B will be cleared, and the yarn C will be taken at the second feed. Accordingly, a pair of stitches will be formed in a single round, the first consisting of the yarn B and the second of the yarn C. If such stitches provide an area the resulting two feed fabric will display alternately the colors of yarns B and C to produce, in effect, a combined color to the eye.

A third alternative results if, by the action of a cam 62, a jack 8 or 8' is moved inwardly only part way. As will presently appear, it will, in this case, be immaterial whether or not the cam 60 is active. Under these circumstances a needle associated with either a jack 8 or a jack 8' will take both yarns A and B at the first feed to produce a stitch with the yarn A plated over the yarn B and at the second feed will take yarn C after clearing the plated stitch just mentioned. The result is the production of a pair of successive stitches, the first showing the color of yarn A, and the second the color of yarn C. As will appear, the fabric thus produced will be that produced also during plain knitting, for example, in a high splice and sole and generally the fabric thus produced would constitute the major area of a stocking and may be referred to as the base fabric, all three yarns being knitted therein.

A fourth alternative results when all of the cams 62 are withdrawn or no cam 62 engages any jack butt 14. Under such circumstances a jack will not be rocked and its corresponding needle will take yarns A and B at the first feed but will miss the yarn C at the second feed. The result will be the production of a single stitch in a round with the yarn A plated over the yarn B. Here again it is immaterial whether or not the cam 60 is active so that the jacks 8 and 8' will not be differentiated.

In summary of the above, it will be evident that during a single round of knitting the following alternatives may occur: first, the production of single feed stitches displaying the color of the yarn B; second, the production of two feed stitches, the first displaying the color of the yarn B and the second the color of the yarn C; third, the production of two feed stitches, the first displaying the color of the yarn A (plated over yarn B) and the second the color of the yarn C; and fourth the production of single feed stitches displaying the color of yarn A (plated over yarn B). By causing these various stitch formations to take place over limited or extended areas of the fabric very elaborate color patterns may be produced, including such patterns as involve the inclusion of colored areas within borders of contrasting colors. It may be noted that when either of the two feed fabrics is produced over any extended area the effective color will be different from the color of either of its components and also from the color of any extended area produced by the yarns at the first feed in either of the alternatives of plating of yarn A over yarn B or of knitting solely yarn B with floating of yarn A.

There will now be described in detail the various paths of pattern jacks, intermediate jacks and needles, which effect the formation of the several types of stitch groups referred to, it being still assumed that cam 38 is in position to engage all needle butts to effect clearing.

The detailed operations involved are the following:

Assume that a needle and its associated elements enter the cam raceways from the right in Figure 1 at cleared level and assume first that leg patterning is being produced so that cams 56, 31, 42, 48, 55 and 80 are withdrawn, and that cam 40 is all the way in so as to engage both long and short butts of the needles. Assume also that the cam 60 is withdrawn.

The jacks will have been levelled by the actions of cams 90 and 50 and their upper ends will be rocked inwardly, and their lower ends outwardly, by the action of cam 58. Assuming now a jack provided with a butt 14 at the level of a cam 62 which is in full inward position, the action of such a cam will rock the lower end of the jack fully inwardly and the jack will thereupon miss the cam 64 as well as all of the other cams except for a slight rise over cam 90 and will, therefore, move in a substantially horizontal path through the whole set of cams. Likewise, the corresponding intermediate jack 6 will move in a level path without being acted upon by any cam except for slight depression by cam 50 following its being slightly raised by the pattern jack under the action of cam 90. The path followed by the corresponding needle is accordingly independent of the intermediate and pattern jack.

The needle having been cleared by the action of cam 38 engages the cam 40 which lowers it to tuck level and it passes horizontally from the lower end of cam 40 to its point of engagement with stitch cam 28. It will accordingly miss yarn A but will take yarn B as it passes down the stitch cam. It is then raised by cams 30 and 32 approaching the second feed stitch cam 34 at tuck level without having its latch cleared. By reason of its low level it misses the yarn C at the second feed and passes down stitch cam 34, being then raised by edge 36 of cam 35 and further raised by cam 38 to clearing height. The result is the formation of a stitch containing only yarn B.

Let it be assumed now that all other conditions being the same the cam 60 is brought into action. If that is the case it will be evident that there will be no effect on jacks 8 and these jacks will follow the path just described with the same resulting action of an associated needle.

On the other hand, if the jack in question is of the type 8' it will follow the path previously described up to the point of engagement of its edge 10' by the cam 60. Its lower end will be caused to rock out by this cam, and, by the action of cam 76 on its butt edge 16, its notch 17 will be caused to embrace the upper edge 78 of the cam 79 and it will then rise up the edge 84 of cam 85, being missed by cam 80 which is withdrawn. In the rise over cam 84 its intermediate jack 6 and needle 2 will also be raised, the latter to clearing level, at which it is capable of taking the yarn C at the second feed. The stitch cam 34 then lowers the needle, the intermediate and pattern jacks having been lowered by edge 46 of cam 35 and these parts then proceed in the previous path.

The result of this last operation is that the stitch yarn B, taken as previously described, is cleared from the latch by the action of the cam 84, and the taking of the yarn C which is cleared over the cam 38 results in the formation of two feed fabric containing a stitch of yarn B and a stitch of yarn C. Thus there is produced the second variation previously described, this variation, of course, being associated only with jacks 8'.

Assume now a jack, either of the type 8 or type 8', the lower end of which is only partially rocked inwardly by the action of a cam 62 on a butt 14. Under these conditions the jack will have its notch 17 engaged with the edge 66 of cam 64 and will rise up this cam carrying with it intermediate jack 6 and, near the end of its upward movement, the needle 2 previously lowered by the cam 40. In passing across the top of the cam 64 the butt 16 will be below the level of the cam 68 so that the lower end of the jack will not be rocked by this but will continue with its notch 17 over the upper edge of the cam and will further rise on the upward slope of edge 74. During the upper portion of this movement intermediate jack 6 and needle 2 will be further raised, the latter to latch clearing level. The needle, accordingly, will follow a path sufficiently high to take the yarn A as well as yarn B, the needle being depressed successively by cams 26 and 28.

After the rise over cam edge 74 the jack will be depressed by the action of cam 54 on the butts 12 or 12'. During this operation its lower end will not be rocked inwardly as its notch 17 is hooked over the continuation of edge 74 of cam 64. Cam 76 will engage butt 16 to move notch 17 inwardly to position to engage the upper edge 78 of the cam 79. Edge 44 of cam 43 being positioned to act slightly later than cam 54, depressed intermediate jack 6 by acting on its butt 7. Thereafter the pattern jack will follow a path as previously described, rising along the cam edge 84 so as to raise its intermediate jack and needle, the latter to clearing level just prior to the second feed stitch cam 34. Thereafter the action is as previously described. The result of this is that both yarns are taken at the first feed and the single yarn at the second feed with the resulting production of two feed fabric with a stitch in which the facing yarn plates the backing yarn followed by a stitch formed from yarn C at the second feed.

It may be noted that during the preceding cycle the jacks will have been raised as they pass the cam 60 so that even if this cam is in active position it will have no effect in differentiating jacks 8 from jacks 8'.

The fourth alternative of operation involves the failure of any cam 62 to engage any butt 14 of a jack. Under this condition a jack will have its lower end, following the action of cam 58, occupying an extreme outer position so that its notch 20 will engage over and ride up the cam edge 66. As will be evident this represents a rise of the jack along a path higher than that resulting from engagement of notch 17 with cam edge 66. An intermediate jack 6 and its corresponding needle are moved upwardly by the pattern jack and follow correspondingly higher paths. When the position of the cam 68 is reached the butt edge 16 will now be in alignment with this cam and, consequently, the lower end of the jack will be pressed inwardly of the surface of the cam 64, the inward movement of the lower edge of the butt 18 taking place through the gap 70 in the upper edge of cam 64. The lower jack butts are not now in any position to engage the cam edge 74 and, accordingly, the jack will move horizontally until its butt 12 or 12' engages cam 54 which lowers the jack to its lowermost position so that through the remainder of the cycle the pattern jack, as well as the intermediate jack associated therewith, will move substantially horizontally. The needle associated with a jack such as just described is depressed by cam 40 and then is returned to latch clearing level as the jack rises over cam edge 66. It remains at this level to take the yarn A at the first feed as it is lowered by cam 26 and then yarn B as it is lowered by cam 28. It then rises over cams 30 and 32 approaching the stitch cam 34 at the second feed at tuck level so as to miss the yarn C. It is finally cleared by passing over cam 38.

In the operation just described the cam 60 is again inoperative even though it may be in its active position due to the fact that as they pass it jacks following the last path will be in elevated position.

The foregoing describes in detail the various operations which occur when patterning is to take place at any point throughout the circumference of the stocking. If. however, patterning at the rear of a stocking is to be interrupted through a high splice or sole, cam 40 is withdrawn so as to miss short butts 4' of needles which knit the area from which patterning is to be omitted, for example, the high splice and sole areas. At the same time cam 56 is introduced to a position to engage long butts 12' which are provided on jacks corresponding to the needles in these areas. By consideration of the previous description it will be evident that the movements of these needles will now be independent of any patterning operations secured by the cams 62, i. e., while various jacks associated with the needles which are to produce the base fabric may pass through paths which would normally effect patterning, the needle path will be such that only the base fabric will be produced. The needles having short butts 4' entering at the right of Figure 1 will pass cam 40 at latch clearing level and will take yarns A and B at the first feed and will then be raised by the jacks as butts 12' move over cam 56 to a clearing level at a point preceding the stitch cam 34 so as to take yarn C at the sec-

ond feed. The result is the production on these needles of the two feed fabric comprising plated stitches formed at the first feed followed by stitches formed at the second feed from the yarn C. At the same time the long butt needles and their associated elements may pass through any one of the other paths to continue patterning, for example in the instep.

It may be noted that striping effects may be readily produced by pulling all of the cams 62 out of action so that the jacks will follow the path including engagement of notches 20 with the cam edge 66. It will also be evident that by combining an operation such as this with the selective placement of jacks 8 and 8' and a predetermined correspondence of long butts 12' of the jacks with short butts 4' of the needles many other possibilities of general patterning are afforded.

Attention may also be called to the fact that if the yarn C at the second feed is fed at a level lower than that indicated it may be taken by those needles which approach stitch cam 34 at tuck level thereby producing tucking instead of floating. In this fashion while the general colors produced will remain about the same there may be produced such local distortions of stitches in various areas as will produce a somewhat different general appearance of the fabric.

A typical pattern such as may be produced in accordance with the above is illustrated in Figures 2 and 3. The stitches are, of course, formalized, being actually distorted particularly where floats occur as is well recognized in the art. At 100 there are illustrated the stiches drawn from yarn B involving floating of yarn A at 102 and the floating of yarn C missed at the second feed. At 104 and 106 are shown the stitches of the two feed base fabric involving the plated stitch 104 and the stitch 106 formed from yarn C at the second feed.

At 108 there is illustrated a stitch formed by both yarns at the first feed associated with floating of the yarn C at the second feed as indicated at 110.

The result produced specially by the action of cam 60 in conjunction with a jack 8' is illustrated at 112, 114 and 116. Here the stitch 112 drawn from yarn B is associated with the float 114 of yarn A and with the stitch 116 formed of yarn C taken at the second feed.

It may be noted that if the yarn C is taken at the second feed without the needles having been previously raised to latch clearing level, the fabric will be that diagrammed in Figure 2 with the exception that the yarn C will be interlocked by succeeding loops instead of being floated. The general appearance of the portion of fabric illustrated in Figure 2 may be better indicated in Figure 3 which shows colors rather than the individual loops. The area 118 consists of the base fabric showing in alternate courses the colors of the yarns A and C, which alternate courses at moderate viewing distances tend to show a blend of these colors in the area, yarn B being hidden by the plating action of yarn A. At 120 an area of alternate courses showing the colors of yarns B and C is provided, this being the area provided by cam 60 in conjunction with jacks 8'.

At 122 is an area showing the color of yarn B. At 124 is an area showing the color of yarn A which in this area is plated over the yarn B. While a simple geometric pattern has been indicated, it will be evident that, due to the four variations which are provided, there may be produced very elaborate patterns, depending upon the selections of those elements which are subject to choice.

It will be evident that striping effects may be produced by striping action imparted to yarn A to remove it from those areas which would in general include it. It may be noted that yarn C may also be removed provided the elements are set up at such times as not to produce two-feed fabric.

In the foregoing description of operation the cam 38 has been assumed in action to effect clearing of all of the needles. Further design possibilities may be introduced if this cam is withdrawn. It will first be assumed that cam 38 is withdrawn to miss all needle butts and that cams 40, 55 and 56 are all withdrawn so as to miss long butts.

A study of Figure 1 will reveal that the withdrawal of cam 38 has no fundamental effect on stitch formation in connection with those needles controlled by jacks which are located in full outward position or in part inward positions after passing the cams 62. All jacks positioned as just mentioned will ride up cam 66 and consequently their needles will be cleared by being raised to the path indicated above the cam 42. While clearing is thus delayed it is nevertheless effected before any yarn is taken at the first feed. Accordingly, two alternative stitch formations are produced as before: if the jack is in intermediate position after passing cams 62 the corresponding needle will produce a plating of yarn A over yarn B and will thereafter take the yarn C to produce two feed work. If the jack is in full outward position after passing cams 62 plating will again be produced at the first feed but the yarn C will be missed at the second feed, if fed at a level to produce this result, or alternatively tucking will be produced if the yarn is fed at a sufficiently low level to be taken by the uncleared needles.

On the other hand, with the cam 38 withdrawn the jacks which are in full inward position after passing the cams 62 will produce results different from those previously produced. A needle controlled by such a jack will leave the cam edge 36 at a low level and will not be raised until there is reached the cam edge 45 which will effect rise of the needle to tuck level. Under these conditions the yarn A will be missed at the first feed while the yarn B will be seized prior to casting off the previously taken loop with the result that tucking will occur. At the second feed results occur similar to those previously referred to: i. e., if cam 60 is out of action the yarn C will be missed or tucked depending upon whether it is fed at a higher or lower level as previously described. On the other hand, if cam 60 is in position for action the needles associated with jacks 8' will be cleared following the first feed and will take and knit the yarn C at the second feed.

For the production of plain high splices and soles cams 55 and 56 are introduced to positions to engage long butts 12' on jacks which correspond in position to the areas in which plain knitting is to be effected. As will be evident from consideration of Figure 1 the cam 55 effects clearing of all needles associated with jacks provided with long butts 12'. Accordingly, stitches are produced by such needles in precisely the same fashion as previously described in connection with the use of cam 38 for clearing.

It may be noted that if the yarn C at the second feed is fed so as to be taken by those needles approaching the feed at uncleared level the tucking thus resulting in combination with the tucking which may be produced at the first feed may be caused to result in tucks in groups running through a series of courses thus providing not only color designs but designs involving puckering of the fabric.

In the operations heretofore considered involving withdrawal of cam 38 the assumption has been made that both yarns A and B are being fed at the first feed. Still further variations may be produced however if either the yarn A or the yarn B is withdrawn from action by the lifting of its corresponding feed finger. As has been pointed out in the alternative operations which were described assuming both yarns being fed, the yarn A is alternatively knit or floated while the yarn B is alternatively knit or tucked. The same operations with respect to these yarns occur, of course, if they are fed individually rather than together and it will be evident that there may thus be produced numerous variations of design involving only two yarns such as A and C or B and C.

To summarize the various alternatives heretofore described, these may be charted as follows with reference to code numbers indicating various conditions involved:

1. Jack part way in; notch 17 engages cam 66.

2. Jack out; notch 20 engages cam 66; yarn C missed by needles at tuck level.

3. Jack fully in to miss cam 66; cam 60 out (or cam 60 in, jacks being of type 8); yarn C missed by needles at tuck level.

4. Jack fully in to miss cam 66; cam 60 in, jacks being of type 8'.

5. Jack out; notch 20 engages cam 66; yarn C seized by needles at tuck level.

6. Jack fully in to miss cam 66; cam 60 out (or cam 60 in, jacks being of type 8); yarn C seized by needles at tuck level.

Using these code numbers to define the conditions involved as above, the various alternatives heretofore described may have their results charted as follows (assuming in all cases cam 40 positioned to engage all butts and cams 55 and 56 withdrawn):

I. With cam 38 in action, yarns A, B and C being fed:

Code No.	First Feed		Second Feed
	A	B	C
1	Plated	Knit	Knit.
2	do	do	Floated.
3	Floated	do	Do.
4	do	do	Knit.
5	Plated	do	Tucked.
6	Floated	do	Do.

II. With cam 38 out, yarns A, B and C being fed:

Code No.	First Feed		Second Feed
	A	B	C
1	Plated	Knit	Knit.
2	do	do	Floated.
3	Floated	Tucked	Do.
4	do	do	Knit.
5	Plated	Knit	Tucked.
6	Floated	Tucked	Do.

III. With cam 38 out, yarns B and C, only, being fed:

Code No.	First Feed		Second Feed
	A	B	C
1	Plated	Knit	Knit.
2	do	do	Floated.
3	Floated	Tucked	Do.
4	do	do	Knit.
5	Plated	Knit	Tucked.
6	Floated	Tucked	Do.

IV. With cam 38 out, yarns A and C, only, being fed:

Code No.	First Feed—B	Second Feed—C
1	Knit	Knit.
2	do	Floated.
3	Tucked	Do.
4	do	Knit.
5	Knit	Tucked.
6	Tucked	Do.

The matter of making plain high splices and soles need not be charted since it has been previously described.

It will be evident from the foregoing that by selective control of the various devices illustrated and described, including striping action of the yarn feeding fingers, the machine may be made to produce a very large variety of elaborate patterns both as to color appearance and as to embossed, puckered or similar effects resulting from tucking the holding of stitches while missing one or more of the yarns at the several feeds.

While not detailed herein it will be evident that because of the provision of short and long butts 4' and 4 toes and heels may be produced in conventional fashion to provide complete stockings.

What is claimed is:

1. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of a single continuous fabric: to cause at least one needle to draw in a single movement past both feed points a pair of stitches, one comprising both the first and second yarns with the first plated over the second, and the other comprising said third yarn; to cause at least a second needle to draw in a single movement past both feed points a single stitch comprising both the first and second yarns with the first plated over the second; to cause at least a third needle to draw in a single movement past both feed points a single stitch comprising, of the aforementioned yarns fed at the first feed point, only the second yarn; and to cause at least a fourth needle to draw in a single movement past both feed points a pair of stitches, one comprising, of the aforementioned yarns fed at the first feed point, only the second yarn, and the other comprising only said third yarn.

2. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the

needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks and selective means operable on said jacks, only following one of said feed points and preceding the other, during the formation of one two-feed round of fabric, to cause at least one needle to draw a single stitch comprising, of the aforementioned yarns fed at the first feed point, only the second yarn; during the formation of a second two-feed round of fabric, to cause at least one needle to draw a pair of stitches, one comprising, of the aforementioned yarns fed at the first feed point, only the second yarn, and the other comprising only said third yarn; during the formation of each of said rounds of fabric to cause at least one needle to draw a pair of stitches, one comprising both the first and second yarns with the first plated over the second, and the other comprising said third yarn; and during the formation of each of said rounds of fabric to cause at least one needle to draw a single stitch comprising both the first and second yarns with the first plated over the second.

3. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of a single continuous fabric: to cause at least one needle to draw in a single movement past both feed points a pair of stitches, one comprising both the first and second yarns with the first plated over the second, and the other comprising said third yarn; to cause at least a second needle to draw in a single movement past both feed points a single stitch comprising both the first and second yarns with the first plated over the second, said second needle missing said third yarn during this movement; to cause at least a third needle to draw in a single movement past both feed points a single stitch comprising, of the aforementioned yarns fed at the first feed point, only the second yarn, said third needle missing said third yarn during this movement; and to cause at least a fourth needle to draw in a single movement past both feed points a pair of stitches, one comprising, of the aforementioned yarns fed at the first feed point, only the second yarn, and the other comprising only said third yarn.

4. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of a single continuous fabric: to cause at least one needle to draw in a single movement past both feed points a pair of stitches, one comprising both the first and second yarns with the first plated over the second, and the other comprising said third yarn; to cause at least a second needle to draw in a single movement past both feed points a single stitch comprising both the first and second yarns with the first plated over the second and to seize in this movement said third yarn prior to clearing the last mentioned stitch; to cause at least a third needle to draw in a single movement past both feed points a single stitch comprising, of the aforementioned yarns fed at the first feed point, only the second yarn and to seize in this movement said third yarn prior to clearing the last mentioned stitch; and to cause at least a fourth needle to draw in a single movement past both feed points a pair of stitches, one comprising, of the aforementioned yarns fed at the first feed point, only the second yarn, and the other comprising only said third yarn.

5. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of a single continuous fabric: to cause at least one needle to draw in a single movement past both feed points a pair of stitches, one comprising both the first and second yarns with the first plated over the second, and the other comprising said third yarn; to cause at least a second needle to draw in a single movement past both feed points a single stitch comprising both the first and second yarns with the first plated over the second, and to cause at least a third needle to draw in a single movement past both feed points a single stitch comprising, of the aforementioned yarns fed at the first feed point, only the second yarn.

6. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of one two-feed round of fabric: to cause at least one needle to draw a single stitch comprising, of the aforementioned yarns fed at the first feed point, only the second yarn; to cause at least a second needle to draw a pair of stitches, one comprising both the first and second yarns with the first plated over the second, and the other comprising said third yarn; and to cause at least a third needle to draw a single stitch comprising both the first and second yarns with the first plated over the second.

7. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of a single continuous fabric: to cause at least one needle to draw in a single movement past both feed

points a pair of stitches, one comprising both the first and second yarns with the first plated over the second, and the other comprising said third yarn; to cause at least a second needle to draw in a single movement past both feed points a single stitch comprising both the first and second yarns with the first plated over the second, said second needle missing said third yarn during this movement; and to cause at least a third needle to draw in a single movement past both feed points a single stitch comprising, of the aforementioned yarns fed at the first feed point, only the second yarn, said third needle missing said third yarn during this movement.

8. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of a single continuous fabric: to cause at least one needle to draw in a single movement past both feed points a pair of stitches, one comprising both the first and second yarns with the first plated over the second, and the other comprising said third yarn; to cause at least a second needle to draw in a single movement past both feed points a single stitch comprising both the first and second yarns with the first plated over the second and to seize in this movement said third yarn prior to clearing the last mentioned stitch; and to cause at least a third needle to draw in a single movement past both feed points a single stitch comprising, of the aforementioned yarns fed at the first feed point, only the second yarn and to seize in this movement said third yarn prior to clearing the last mentioned stitch.

9. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of a single continuous fabric: to cause at least one needle to draw in a single movement past both feed points a pair of stitches, one comprising both the first and second yarns with the first plated over the second, and the other comprising said third yarn; to cause at least a second needle to draw in a single movement past both feed points a single stitch comprising both the first and second yarns with the first plated over the second; and to cause at least a third needle to draw in a single movement past both feed points a pair of stitches, one comprising, of the aforementioned yarns fed at the first feed point, only the second yarn, and the other comprising only said third yarn.

10. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of one two-feed round of fabric: to cause at least one needle to draw a pair of stitches, one comprising, of the aforementioned yarns fed at the first feed point, only the second yarn, and the other comprising only said third yarn; to cause at least a second needle to draw a pair of stitches, one comprising both the first and second yarns with the first plated over the second, and the other comprising said third yarn; and to cause at least a third needle to draw a single stitch comprising both the first and second yarns with the first plated over the second.

11. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of a single continuous fabric: to cause at least one needle to draw in a single movement past both feed points a pair of stitches, one comprising both the first and second yarns with the first plated over the second, and the other comprising said third yarn; to cause at least a second needle to draw in a single movement past both feed points a single stitch comprising both the first and second yarns with the first plated over the second, said second needle missing said third yarn during this movement; and to cause at least a third needle to draw in a single movement past both feed points a pair of stitches, one comprising, of the aforementioned yarns fed at the first feed point, only the second yarn, and the other comprising only said third yarn.

12. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of a single continuous fabric: to cause at least one needle to draw in a single movement past both feed points a pair of stitches, one comprising both the first and second yarns with the first plated over the second, and the other comprising said third yarn; to cause at least a second needle to draw in a single movement past both feed points a single stitch comprising both the first and second yarns with the first plated over the second and to seize in this movement said third yarn prior to clearing the last mentioned stitch; and to cause at least a third needle to draw in a single movement past both feed points a pair of stitches, one comprising, of the aforementioned yarns fed at the first feed point, only the second yarn, and the other comprising only said third yarn.

13. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding

at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of a single continuous fabric: to cause at least one needle to draw in a single movement past both feed points a pair of stitches, one comprising both the first and second yarns with the first plated over the second, and the other comprising said third yarn; to cause at least a second needle to draw in a single movement past both feed points a single stitch comprising, of the aforementioned yarns fed at the first feed point, only the second yarn; and to cause at least a third needle to draw in a single movement past both feed points a pair of stitches, one comprising, of the aforementioned yarns fed at the first feed point, only the second yarn, and the other comprising only said third yarn.

14. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of a single continuous fabric: to cause at least one needle to draw in a single movement past both feed points a pair of stitches, one comprising both the first and second yarns with the first plated over the second, and the other comprising said third yarn; to cause at least a second needle to draw in a single movement past both feed points a single stitch comprising, of the aforementioned yarns fed at the first feed point, only the second yarn, said second needle missing said third yarn during this movement; and to cause at least a third needle to draw in a single movement past both feed points a pair of stitches, one comprising, of the aforementioned yarns fed at the first feed point, only the second yarn, and the other comprising only said third yarn.

15. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of a single continuous fabric: to cause at least one needle to draw in a single movement past both feed points a pair of stitches, one comprising both the first and second yarns with the first plated over the second, and the other comprising said third yarn; to cause at least a second needle to draw in a single movement past both feed points a single stitch comprising, of the aforementioned yarns fed at the first feed point, only the second yarn and to seize in this movement said third yarn prior to clearing the last mentioned stitch; and to cause at least a third needle to draw in a single movement past both feed points a pair of stitches, one comprising, of the aforementioned yarns fed at the first feed point, only the second yarn, and the other comprising only said third yarn.

16. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of a single continuous fabric: to cause at least one needle to draw in a single movement past both feed points a single stitch comprising both the first and second yarns with the first plated over the second; to cause at least a second needle to draw in a single movement past both feed points a single stitch comprising, of the aforementioned yarns fed at the first feed point, only the second yarn; and to cause at least a third needle to draw in a single movement past both feed points a pair of stitches, one comprising, of the aforementioned yarns fed at the first feed point, only the second yarn, and the other comprising only said third yarn.

17. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of a single continuous fabric: to cause at least one needle to draw in a single movement past both feed points a single stitch comprising both the first and second yarns with the first plated over the second, said needle missing said third yarn during this movement; to cause at least a second needle to draw in a single movement past both feed points a single stitch comprising, of the aforementioned yarns fed at the first feed point, only the second yarn, said second needle missing said third yarn during this movement; and to cause at least a third needle to draw in a single movement past both feed points a pair of stitches, one comprising, of the aforementioned yarns fed at the first feed point, only the second yarn, and the other comprising only said third yarn.

18. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of a single continuous fabric: to cause at least one needle to draw in a single movement past both feed points a single stitch comprising both the first and second yarns with the first plated over the second and to seize in this movement said third yarn prior to clearing the last mentioned stitch; to cause at least a second needle to draw in a single movement past both feed points a single stitch comprising, of the aforementioned yarns fed at the first feed point, only the second yarn and to seize in this movement said third yarn prior to clearing the last mentioned stitch; and to cause at least a third needle to draw in a

single movement past both feed points a pair of stitches, one comprising, of the aforementioned yarns fed at the first feed point, only the second yarn, and the other comprising only said third yarn.

19. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of a single continuous fabric: to cause at least one needle to draw in a single movement past both feed points a pair of stitches, one comprising both the first and second yarns with the first plated over the second, and the other comprising said third yarn; to cause at least a second needle to draw in a single movement past both feed points a single stitch comprising both the first and second yarns with the first plated over the second; to cause at least a third needle, in a single movement past both feed points, to seize, of the aforementioned yarns fed at the first point, only the second yarn; to cause at least a fourth needle, in a single movement past both feed points, to seize, of the aforementioned yarns fed at the first feed point, only the second yarn, and to draw a stitch comprising the third yarn.

20. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of a single continuous fabric: to cause at least one needle to draw in a single movement past both feed points a pair of stitches, one comprising both the first and second yarns with the first plated over the second, and the other comprising said third yarn; to cause at least a second needle to draw in a single movement past both feed points a single stitch comprising both the first and second yarns with the first plated over the second; to cause at least a third needle, in a single movement past both feed points, to seize, of the aforementioned yarns fed at the first point, only the second yarn.

21. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of a single continuous fabric: to cause at least one needle to draw in a single movement past both feed points a pair of stitches, one comprising both the first and second yarns with the first plated over the second, and the other comprising said third yarn; to cause at least a second needle to draw in a single movement past both feed points a single stitch comprising both the first and second yarns with the first plated over the second; to cause at least a third needle, in a single movement past both feed points, to seize, of the aforementioned yarns fed at the first feed point, only the second yarn, and to draw a stitch comprising the third yarn.

22. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of a single continuous fabric: to cause at least one needle to draw in a single movement past both feed points a pair of stitches, one comprising both the first and second yarns with the first plated over the second, and the other comprising said third yarn; to cause at least a second needle, in a single movement past both feed points, to seize, of the aforementioned yarns fed at the first point, only the second yarn; to cause at least a third needle, in a single movement past both feed points, to seize, of the aforementioned yarns fed at the first feed point, only the second yarn, and to draw a stitch comprising the third yarn.

23. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part their movements, means for feeding at least a first yarn and a second yarn to the needles at a first feed point, means for feeding at least a third yarn to the needles at a second feed point, cams for controlling lengthwise movements of the needles and jacks, and selective means operable on said jacks, only following one of said feed points and preceding the other, and during the formation of a single continuous fabric: to cause at least one needle to draw in a single movement past both feed points a single stitch comprising both the first and second yarns with the first plated over the second; to cause at least a second needle, in a single movement past both feed points, to seize, of the aforementioned yarns fed at the first point, only the second yarn; to cause at least a third needle, in a single movement past both feed points, to seize, of the aforementioned yarns fed at the first feed point, only the second yarn, and to draw a stitch comprising the third yarn.

24. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding yarns to the needles at a pair of feed points, selective means operable on said jacks only following one of said feed points and preceding the other for setting the jacks in at least three different positions, and cams for controlling lengthwise movements of the needles and jacks in accordance with the settings of the jacks so that the needles will follow two paths past one feed point according to one pattern of grouping of the needles and will follow two paths past the second feed point according to a different pattern of grouping of the needles, with all of the needles seizing yarn at one of said feed points irrespective of their paths.

25. In a knitting machine, needles, jacks individually associated with said needles and controlling, in part, their movements, means for feeding yarns to the needles at a pair of feed

points, selective means operable on said jacks only following one of said feed points and preceding the other for differentially setting the jacks, and cams for controlling lengthwise movements of the needles and jacks in accordance with the setting of the jacks during the formation of a single continuous fabric: to cause at least one needle to move past one of said feed points in a first path and past the other of said feed points in a second path; to cause at least a second needle to move past the first mentioned feed point in a third path and past the second mentioned feed point in a fourth path; and to cause at least a third needle to move past the first mentioned feed point in said first path and past the second mentioned feed point in said fourth path.

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